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BIOME-BGC: TERRESTRIAL ECOSYSTEM PROCESS MODEL, VERSION 4.1.1

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Summary:

Biome-BGC is a computer program that estimates fluxes and storage of energy, water, carbon, and nitrogen for the vegetation and soil components of terrestrial ecosystems. The primary model purpose is to study global and regional interactions between climate, disturbance, and biogeochemical cycles.

Biome-BGC represents physical and biological processes that control fluxes of energy and mass. These processes include the following:

- New leaf growth and old leaf litterfall
- Sunlight interception by leaves and penetration to the ground
- Precipitation routing to leaves and soil
- Snow accumulation and melting
- Drainage and runoff of soil water
- Evaporation of water from soil and wet leaves
- Transpiration of soil water through leaf stomata
- Photosynthetic fixation of carbon from CO₂ in the air
- Uptake of nitrogen from the soil
- Distribution of carbon and nitrogen to growing plant parts
- Decomposition of fresh plant litter and old soil organic matter
- Plant mortality
- Fire

The model uses a daily time-step, meaning that each flux is estimated for a one-day period. Between days the program updates its memory of the mass stored in different components of the vegetation, litter, and soil.

Weather is the most important control on vegetation processes. Flux estimates in Biome-BGC depend strongly on daily weather conditions. Model behavior over time depends on climate--the history of these weather conditions.

Biome-BGC Version 4.1.1 was developed and is maintained by the Numerical Terradynamic Simulation Group, School of Forestry, The University of Montana, Missoula, Montana, USA. Additional information can be found on their web site at: <http://www.ntsg.umt.edu/>.

Data Citation:

Cite this model product as follows:

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Model Product Description:

Model Documentation and User's Guide

The complete users guide is available at ftp://daac.ornl.gov/./data/model_archive/BIOME_BGC/biome_bgc_4.1.1/comp/bgc_users_guide_411.pdf. There is also a companion file of model release documentation, http://daac.ornl.gov/daacdata/model_archive/BIOME_BGC/biome_bgc_4.1.1/comp/BiomeBGC_v411_release.pdf.

Source Code

All of the source code for the Biome-BGC model, Version 4.1.1, released July 2000, including operating instructions and example input and output files, is available.

Model code files:

Model Scale and Resolution

Biome-BGC has a daily time-step and no explicit spatial scale. The model has an intermediate number of vegetation (4) and litter/soil (3) pools.

Precursors

Biome-BGC is a multi-biome generalization of FOREST-BGC, a model originally developed to simulate a forest stand development through a life cycle (Running and Coughlan, 1988; Running and Gower, 1991). Biome-BGC combines Forest-BGC with MT-CLIM, which extrapolates meteorological driving variables from valleys to different slopes, aspects, and elevations (Running and Hunt 1993).



[Home](#)

About Us

- [Who We Are](#)
- [Partners](#)
- [User Working Group](#)
- [Biogeochemical Dynamics](#)
- [Data Citation Policy](#)
- [News](#)
- [Workshops](#)

Get Data

- [Complete Data Set List](#)
- [Search for Data](#)
- [Field Campaigns](#)
- [Validation](#)
- [Regional/Global](#)
- [Model Archive](#)

Data Management

- [Plan](#)
- [Manage](#)
- [Archive](#)
- [DAAC Curation](#)
- [Submit Data](#)

Tools

- [Data Search](#)
- [Site Search](#)
- [Search by DOI](#)
- [WebGIS](#)
- [SDAT](#)
- [MODIS Land Subsets](#)
- [THREDDS](#)

Help

- [FAQs](#)

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